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Blending to Control Fat in Processed Meats

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Blending to Control Fat in Processed Meats

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The quality and production cost of processed meat products, such as bologna, loaves, fresh sausage and ground beef, can vary greatly depending on the source of raw materials used in their formulation. One way to minimize these quality and cost fluctuations, while insuring finished product compliance with USDA and state regulations, is by controlling the percent of fat, protein and water. Since these three meat constituents are interrelated, the control of one helps maintain control of the other two—provided that you allow for processing shrink and added condiments.

The fat portion of meat is the easiest to analyze chemically or mechanically. By knowing the fat content of various ingredients, one could blend, by mixing, any two raw materials or two combinations of raw materials to a specific, desired fat level. (You could do the same thing for protein and water, if the percentages were known.)

This publication has been prepared for meat plant operators who would like to implement an in-plant blending program to control raw material and finished product fat contents. Discussed are the two commonly-used methods (algebraic and Pearson square) for calculating proper blend of raw materials to achieve desired fat levels. Also presented is a sample blend problem to be solved by each method. Both can easily be mastered with a little practice.

THE ALGEBRAIC METHOD

This is based on a simple mathematical equation taught in basic algebra. It utilizes the principle of percentages of two items in relation to each other.

Formula

$$a + b = c$$

where a = % fat in raw material a
b = % fat in raw material b
c = desired % fat when a and b are blended

Example

Your sausage formulation calls for regular pork trimmings, which normally analyze 55% fat. However, you've run out of regular trimmings so you want to substitute a mixture of jowls (analyzed at 68% fat) and boneless picnics (analyzed at 26% fat) to make a blend that maintains this 55% level. How many pounds of jowls and boneless picnics must be blended together to replace 100 pounds of regular pork trimmings?

Steps

1. Set up the equation.

a	+	*b*	=	*c*
(% fat jowls)		*(% fat picnics)*		*(% fat desired)*

2. Insert values into the equation.

68 + 26 = 55

3. Subtract the smallest number from all three values (26 in this example).

68	+	*26*	=	*55*
-26		*-26*		*-26*
42		*0*		*29*

4. Divide the number to the right of the equal sign in Step 3 by the remaining number on the left of the equal sign, and multiply by 100.

29 ÷ 42 = 0.69 x 100 = 69 lbs. jowls/100 lbs. 55% fat blended product

5. Subtract Step 4 from 100 to determine quantity of the other raw material.

100 - 69 = 31 lbs. boneless picnic/100 lbs. 55% fat blended product.

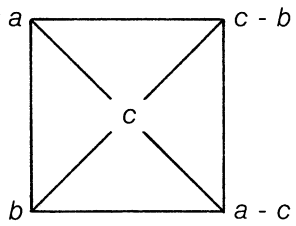
THE PEARSON SQUARE METHOD

This method is a diagrammatic version of the algebraic approach—that is, you actually draw a diagram of what to do.

Formula

Draw a square and identify the corners and intersection of the diagonal lines as shown below, using a, b and c

where a = % fat in raw material a
b = % fat in raw material b
c = desired % fat when a and b are blended

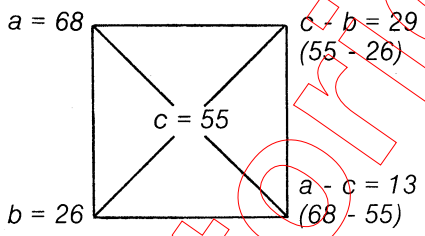


Example

Let's use the same example as illustrated in the algebraic method, where you wish to make a 55% fat blended product by mixing jowls (68% fat) and boneless picnics (26% fat).

Steps

1. Set up the square by inserting the values.



2. Add the two numbers on the right side of the square. (Note that this is the same as subtracting 26 from 68 in Step 3 of the algebraic method.)

29 + 13 = 42

3. Divide the largest number on the right side of the square by the number obtained in Step 2, and multiply by 100. The letter on the left side of the square directly across from the largest number on the right side identifies the raw material referred to in this step. (This is the same figure obtained in Step 4 of the algebraic method.)

29 ÷ 42 = 0.69 x 100 = 69 lbs. jowls/100 lbs. 55% fat blended product

4. Subtract Step 3 from 100 to determine quantity of raw material b.

100 - 69 = 31 lbs. boneless picnic 100 lbs. 55% fat blended product

CROSS-CHECKING FOR ACCURACY

Regardless of the method used, it's always wise to double-check to make sure you haven't used the wrong percentage on the wrong trimming. Here's how.

1. Lbs. of raw material a *(69)* x % fat in a *(.68)* = Lbs. fat in a *(46.9)*

2. Lbs. of raw material b *(31)* x % fat in b *(.26)* = Lbs. fat in b *(8.1)*

3. Lbs. fat in a *(46.9)* + Lbs. fat in b *(8.1)* = Desired fat level/100 lbs. of blend *(55)*

DETERMINING BLENDS FOR DIFFERENT BATCH WEIGHTS

Remember that the values obtained by the algebraic and Pearson square methods may be expressed either as percentages or as pounds per 100 pounds. For blends larger or smaller than 100 pounds, simply multiply batch weight desired by each percentage to find the amount of each trimming required for that specific batch weight. For example, you need a 750-pound batch of the 55% fat jowl-boneless picnic blend.

1. Batch weight *(750)* x % jowls in blend *(.69)* = Lbs. jowls needed *(517.5)*

2. Batch weight *(750)* x % picnics in blend *(.31)* = Lbs. picnic needed *(232.5)*

3. Cross-check: Lbs. jowls needed *(517.5)* + Lbs. picnic needed *(232.5)* = Batch weight *(750)*

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